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ROCKY MOUNTAIN FOREST AND RANGE EXPERIMENT STATION

An Instrument for Measuring Tree Crown Width

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A small, handheld instrument for measuring tree crown widths has proved to be accurate, and has several advantages over existing equipment. A materials list and construction diagram are included.

Keywords: Forest survey instrument, tree measurement.

Several instruments have been developed to measure tree crown diameters, among them the "Moosehorn" (Robinson 1947), the Reflecting Crownmeter (Holdsworth, Curtis, and McCleary 1936) and the modified Abney level (Buell 1936). Field conditions in the Rocky Mountains require an instrument that is small, of simple design, accurate, easily used, and lightweight, but durable. None of the existing instruments meet all of these requirements. The instrument described here is based on design principles of existing instruments, but meets the above requirements.

Description

The body of the instrument is a wooden case, 7 by 3-3/4 by 3-1/2 inches (fig. 1). A mirror is mounted inside the case at a 45° angle to the line of sight through the tapered eyepiece. The plexiglass top protects the mirror and has the sighting crosshair scribed upon it. Two level bubbles, which can be seen through the eyepiece, are mounted above the plexiglass plate; this enables the user to level the instrument on a horizontal plane.

Use

Positioning himself under the approximate edge of the crown, the user peers through the

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Figure 1.--The completed instrument.

eyepiece, maneuvering the instrument until the edge of the crown appears in the field of view. He then adjusts his position, keeping the level bubbles centered, to place the image of the crown edge on the crosshair. The instrument is then directly under the edge of the crown (fig. 2). Marking the position, the user repeats



Figure 2.--The instrument in use.

the process on the opposite side of the tree. The distance between the two points is the crown diameter in that dimension. Two measurements at right angles will give an adequate average crown width.

Construction

The instrument can be constructed in a few hours with easily available materials at a cost under 10 dollars (fig. 3). The case is constructed from 1/4-inch plywood; oak or other wood paneling is preferable for a better appearance. Beveled corners, recommended for strength and appearance, will require a miter saw for properly fitted joints. All dimensions are outside measurements, including the 1/4-inch bevels. Epoxy glue is used to join all parts except the mirror, which is fastened with rubber cement to facilitate removal if it breaks. Best results are obtained if jigs are fashioned to hold the parts until dry. The tapered eyepiece parts should be glued first, then joined to the other parts; otherwise the pieces are difficult to manage.

The back is fastened with wood screws and can be removed. The plexiglass then slides out so the mirror can be cleaned or replaced. The level bubbles are glued to plexiglass strips which are bolted to the case for easy removal. A spray-on oil-type finish is recommended to protect the wood.

An optional handle can be fixed to the case. The removable handle used here is a replacement trowel handle into which a sawed-off 3/8-inch stovebolt has been glued. The handle

screws into a tapped 1/8-inch aluminum plate mounted inside the bottom of the case.

Advantages

The small size and large field of view enable this instrument to be handheld and easily positioned under the edge of the tree crown. Since the two bubbles level the instrument on a horizontal plane, the user can stand in any direction with respect to the tree and still obtain an accurate measurement. The instrument is rugged enough to survive jostling in a pack or vehicle without damage, since it has no moving parts or delicate mechanism. After considerable field use, it has proven to be a quick, accurate means of measuring tree crown widths.

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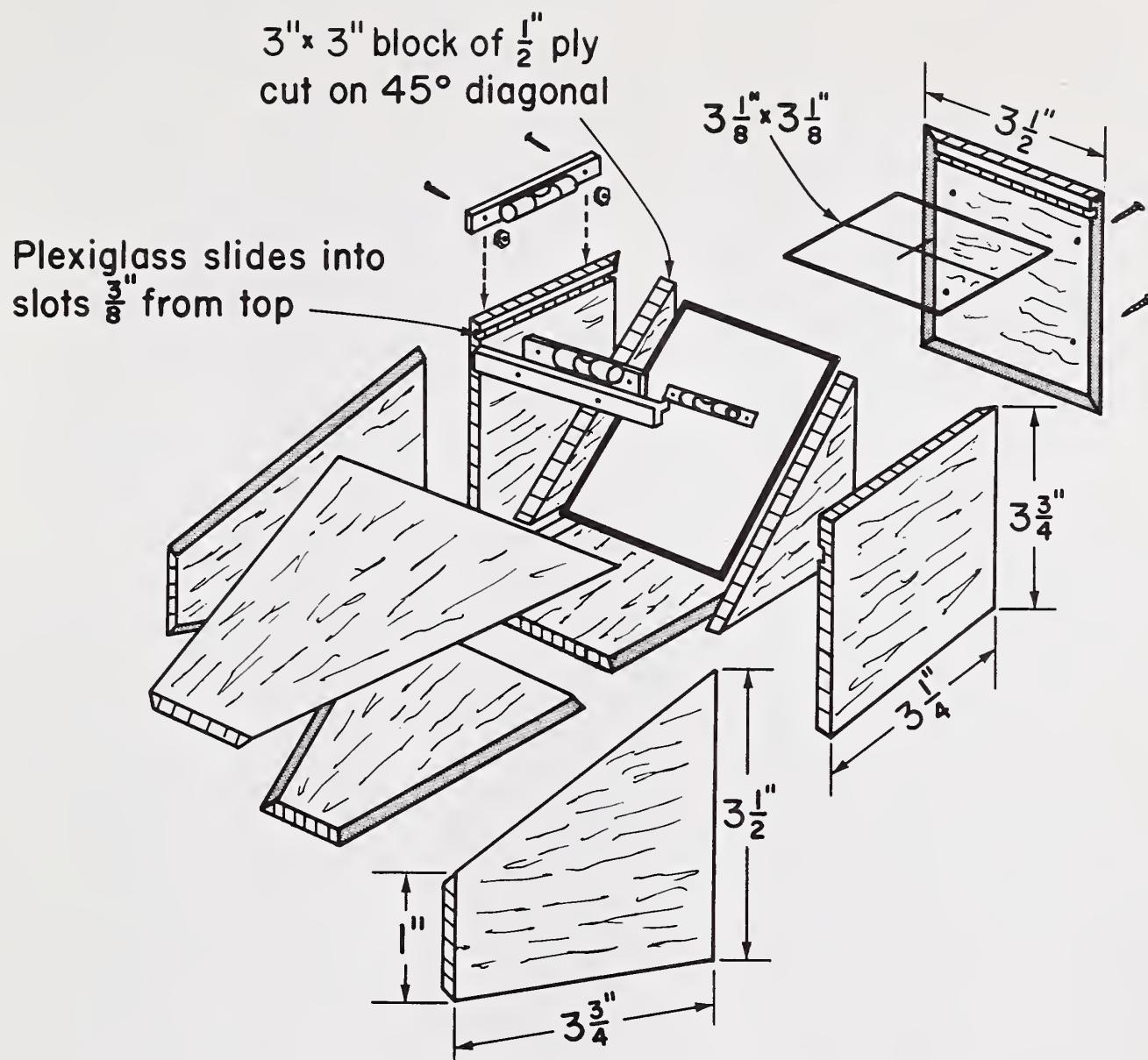


Figure 3.--Blowup diagram of the instrument.

MATERIALS USED

- 1 wood paneling piece, 2 by 2 feet, $1/4$ inch thick
- 1 plexiglass piece, $3\frac{1}{8}$ by $3\frac{1}{8}$ inches, $1/8$ inch thick
- 2 plexiglass strips, $3/8$ by $2\frac{1}{2}$ inches, $1/8$ inch thick
- 2 replacement bubbles for a Stanley carpenter's level
- 1 mirror, 3 by 4 inches
- 1 plywood scrap, 3 by 6 inches, $1/2$ inch thick
- 4 wood screws, $3/4$ inch long
- 4 number 2 machine screws, $1/2$ inch long with nuts and washers
- Epoxy glue
- Rubber cement

- Optional Handle:**
- 1 replacement trowel handle
- 1 $3/8$ -inch stovebolt, 2 inches long
- 1 aluminum plate, 2 by 2 inches, $1/8$ inch thick

